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EXECUTIVE AND PERSONNEL  
MANAGEMENT  
ON THE  
NATIONAL FORESTS



A MEDIUM FOR THE EXCHANGE OF IDEAS AND  
EXPERIENCES BY OPERATING EXECUTIVES  
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## EXAMPLES OF OVERGRAZING BY GAME

By P. G. REDINGTON

For the last three decades I have been deeply interested in game, particularly the wild ruminant animals.

Early in the game—1904—I had the opportunity to size up the situation which confronted the elk herds of the southern Yellowstone country. It seemed certain at that time that measures should very soon be taken to provide forage for these animals as they came down into Jackson's Hole when storm and snow drove them out from the higher elevations. The Forest Service, working with the Wyoming State Game Commission and the Biological Survey, accomplished this task. However, despite the hard winter of 1919, when many animals died, this herd of elk has increased to a population now of over 20,000 animals. The take by hunters is small, and by no means gets rid of the surplus.

Mr. O. J. Murie, of the Biological Survey, has for the past six years been under assignment to study the life history of the southern Yellowstone elk herd. Their various environments, their food habits, diseases, mating, rate of increase, conflict with domestic stock, etc., have received meticulous scrutiny. His report will soon be published, and will, I know, be of real interest to all those forest officers who have to deal with the respective elk situations everywhere.

My second experience occurred when I was working in the Routt Forest in Colorado in 1905. I was called upon to investigate a large area in that forest, where two men interested in game suggested that the Forest Service turn over a large area of the forest to be managed as a private game park. These men were sincere in their desire to give game, particularly the elk which were found in the forest, a better chance. The matter was fully gone into by the proponents and thoroughly threshed out with the Washington office. The final decision by the Forester was: were we to yield to the desire of the applicants to alienate forest land for such a purpose, the Forest Service would be greatly embarrassed in the future by the precedent set. The project was not approved.

In 1922, owing to the presence of the very large population of the Columbian black-tail deer, a census was made of the animals on what is now the Mendocino Forest in California. This was in the winter time, and the deer were feeding in the large glades at the lower elevations of the forest. We estimated that 40,000 of these animals ranged through the forest. Last year I was in California and learned from Mr. J. W. Nelson that only about 15,000 deer were to be found within the environs of the Mendocino Forest. The decrease might have come about either by overshooting, disease, work of predators, or the presence of too many domestic livestock.

I have been familiar, since 1916, with the game situation in the Southwestern Region. As I now recall, in New Mexico there was not then much concern as to the population of deer, elk and antelope. Since that time, however, bad situations have arisen in some areas where overpopulation became serious.

The Forest Service, working with the State Game Commission, has been enabled, by hunting, to reduce surpluses of deer adjacent to the Lincoln Forest and on the Gila. On the latter area substantial numbers of deer and antelope were taken by hunting under a planned program.

In 1914, seventy-five elk were introduced into the Chevalon District of the Sitgreaves Forest. They have lived through all the subsequent years in a refuge. No shooting was allowed. I had the chance last September to spend a few days on the Sitgreaves and Coconino forests accompanying forest officers, the State Game Commissioner, and the State Game Warden. It was evident immediately to all present that the original number of elk had increased many fold in population. Everywhere we found unmistakable evidence that there were too many elk. The damage was plainly seen and easily diagnosed by the investigation made as to the heavy damage done by these animals on such palatable browse plants as juniper, aspen, mahogany, oak brush, cliffrose, etc. To make matters worse, the mule deer were numerous in these areas and were competing with elk on the various palatable browse plants. Everyone in the party acknowledged the presence of too many animals. The estimated number was put down as from 3,500 to 5,000. It was the conclusion of all concerned that an open season should be recommended, under which 150 bull elk should be taken out. We learned later that no action was taken, probably due to the protests of sentimentalists who, themselves, knew but little of the facts on the ground. A very serious situation must ensue if action is not soon taken to reduce the numbers of the herd.

On the other hand, the State Game Warden of Arizona, appreciating the overcrowded situation of the mule deer on many areas, did, last fall, open previously closed areas to shooting. The refuge in the Walnut Creek Division of the Prescott Forest was opened up for shooting. Just how many areas were released for the purpose of taking surplus I cannot say, but the step decided upon by the State Game Warden was in the right direction.

Overbrowsing was found in the Graham Mountains out of Safford. Aspen sprouts, mahogany, oak, etc., were heavily grazed. I might say here, parenthetically, that in most of the areas we visited very few new sprouts of aspen were seen. In the areas examined we found many clumps of the so-called bear grass (*Nolina microcarpa*). This plant sends up a long shoot resembling somewhat the spike of the asparagus. Deer are very fond of this bear grass spike, and it is voraciously eaten. Mearns, or fool quail, have a liking for the plant because of the large seed crop produced in the spike. It so happens, however, that the deer get to the spike first. We saw no bear grass spikes in open country. They had long since been chewed down by the deer. However, in sample plots fenced to keep out the deer, there were found many of the spikes loaded with seed. The quail stripped the mature seed avidly. This is one of the complexes which exists in game management.

I understand from Supervisor Winn that the same situation as to overpopulation of the Sonoran deer on the Catalinas is a very heavy one and most difficult to determine how to get rid of the surplus.

In 1933 I also visited the Chiricahuas Division of the Coronado Forest with Musgrave and Fred Winn. Here is to be found the diminutive Sonoran white-tail deer, a most difficult animal to see because of its small stature and rapidity of pace.

Like most of the forests of the Southwestern District, the Chiricahuas rise sharply up from the desert country below. The terrain is very rugged and rocky, the soil in many places is shallow, except in the pineries and the low elevations. Slopes are steep. I do not recall the number of cattle which range throughout the division, but I do know there is some grazing permitted. Cattle will browse as well as deer. We noted in the territory we visited many overgrazed areas. Erosion was all too evident. If the cattle do range in considerable numbers, enough to bring about overgrazing, they are certainly aided and abetted by the deer. It does not take long, in such a rough country, to start trouble. With the progressive injury to the browse plants no one can avoid the conclusion that erosion will quickly follow. If the cattle situation has been taken care of, the next step is to work up a game management plan to get rid of surplus. It will be very difficult to decrease the numbers of deer because of their ability to take care of themselves. The hunters know this well. We noted the extensive damage done in many parts of this forest to palatable browse plants.

As many know, antelope have increased rapidly in numbers in late years on the Anderson Mesa of the Coconino Forest, and in the areas around Kendrick Mountain in the Coconino and Tusayan. Supervisor Miller drove me out to these areas and then proceeded north into the Cedar Ranch country, a wintering area. A favorite plant known as chamise at one time gave subsistence to the antelope, but the winter ranges had been so overused, to a point that this chamise plant has practically all disappeared. In this area, also, the mule deer resort in winter and appear to compete with the antelope on the browse plants.

I have had the fortune to visit Alaska many times in connection with the work of the Alaska Game Commission. Two years ago it was agreed between the Executive Officer of the Commission and the Forest Service to make a reconnaissance of the big brown and grizzly bear situation on Admiralty Island, and to formulate a management plan for the handling of these great animals. The plan is soon to be published, and will be of genuine interest, not only to forest officers, but to the large coterie of private individuals who stand squarely for the better protection of these animals.

Enough of examples. They can be duplicated in hundreds of areas elsewhere. A good job has been done on the Kaibab Forest. I was very much interested in Mann's recent statement as to the policy set up for game management on that great plateau.

The sentimentalist must have his day, no matter if he does not have any knowledge of the actual facts. Most probably he speaks from hearsay only, and I will say it is extremely difficult for members of this class to change their point of view. This is one of the hurdles that must be removed. Forest officers

and State game commissioners must assume the role of educators and try their best to put those who believe that "nature's balance still exists" on the right path. Forest officers are in a position to do so because they are, or should be, in comparatively close touch with those gentlemen and ladies who but little understand anything in regard to a game management plan.

It appears to me that we cannot longer dodge the critical situation which we know exists on many of the National Forests. Tremendous damage is being done by overbrowsing on the species palatable to deer, elk, and antelope. This fact cannot be questioned. I would recommend that every tool in our hands should be used to straighten out the bad situations first; and second, by preventive measures to stop in their incipiency these projects which can be classed as already threatening.

Specifically, why not work as rapidly as possible under the decision given by the Federal Court in the Kaibab case? This was recently done, I understand, in Wisconsin to prevent the damage done by rabbits on newly planted pine seedlings. Difficulties will have to be faced. Game Commissioners will have something pertinent to say in this connection, and there will be a big cry from sentimentalists.

I agree that forest managers will be needed to work out the details of management plans alongside of the biologists. Where wild game is of major importance on National Forests, and bound to be suffering for food by competition with domestic stock, each group of animals, game and domestic, should be given proper treatment in a reduction process. It will be easier to handle the domestic stock, but the problem is not so clear in the removal of surplus game animals.

Many of the National Forests abut unreserved, unappropriated public domain which is not under any real form of control. This situation is found in Montana, where on the winter range of the Sun River elk herd they cannot find sufficient food. It is difficult to determine just what can be done to alleviate the situation, because of divided views of governmental agencies.

I was interested in the statement of A. R. Standing on page 24 of Number 23 as to botany. While I had a very fine course in dendrology, I never had the time to delve deeply into botanical science. I heartily agree with Standing that the range manager should be well versed in that science. While in the Biological Survey I was really amazed to learn how our own ornithologists and mammologists had studied botany. Major Goldman, Vernon Bailey and others were very adept in the botanical field, and, when on wild-life investigation work, the botanical side was brought very much into the picture.

I believe through co-operation that the qualified men of the Survey would be of great help to the range manager, and I will be very glad to suggest to the new Chief of the Biological Survey that its co-operation will be deeply appreciated in connection with the game problems on the National Forests.

## WILD-LIFE REFUGES

By H. N. WHEELER

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The history of game hunting in this country is a story of slaughter to the point of extermination.

Wild animals, birds and fish were a good part of the food of the early settlers. As the number of settlers increased, forests were destroyed, fires spread unchecked, and game disappeared, especially the large game animals, such as buffalo, deer, elk, and antelope. When the supply approached the vanishing point, closed hunting seasons were established in the hope that the game would come back. False security by those who thought this would protect the game, and poaching by those who believed game belonged to whoever could get it, prevented any material comeback by the close season method. Closed seasons for all or part of the year did not bring back the game in California and Colorado, to my personal knowledge. Some thirty years ago Pennsylvania evolved the idea of game refuges and set aside State-owned lands where no hunting was permitted, educated its people to protect game and respect the rights of the State concerning it, eliminated chasing deer with dogs, enforced the game laws, and the game, especially deer, bears and wild turkeys, besides smaller animals and birds, came back.

The areas known as refuges or sanctuaries are breeding grounds, where the surplus animals spread to adjoining lands and furnish hunting in an open season. Other States, following the example of Pennsylvania, are bringing back game, especially deer. Hunting of deer was against the law for many years in Colorado, but the animals increased in number very slowly. The same was true in some areas in California. Game refuges were established, and the deer increased rapidly. For years deer were almost extinct in the foothills of the Roosevelt National Forest. They are fairly plentiful now, in spite of poaching and an unsympathetic attitude of the State game department toward game refuges.

There is no object in permitting game animals to die of old age, except possibly in a zoo or a play area where the chief value of the animals is for thousands of people to see them and play with them. So when the game has increased by the refuge method, management plans should be worked out. Refuges should not be too large, and as time goes on the big ones can be cut up into smaller areas. Poachers must be severely dealt with, and the people as a whole educated as to the proper value of game. Landowners over the United States are charging for hunting on their lands, and are hiring out as guides, and are leasing dogs. A man in Texas owning 500 acres of land took in last year \$350 from deer hunters. Eventually, if the Forest Service can establish ownership to game on the forests, the cash return from hunting privileges would become a material asset. As game increase, stock grazing must decrease, or better yet, stock grazing should be reduced so game can increase. Few people, even foresters, know when an area is really overgrazed. We are slowly learning. It might be said that livestock is worth more than the game. But

is it? In one county in Florida land owned for hunting privileges only, pays \$50,000 in taxes into the county treasury. In one county in South Carolina 150,000 acres are owned by wealthy people just for hunting purposes. These owners spend \$2 per acre per year, 20 cents of it for taxes. Money spent for firearms, ammunition, gasoline, hotel bills, guides, etc., in any game country amounts to a considerable figure. The value to the hunters in health and increased business efficiency is inestimable, but real nevertheless. A real service will be rendered the stockmen if the number of domestic animals permitted on the range is reduced. It stops speculative buying, and eventual bankruptcy. Many ranchers would profit if they grazed part of their meadow lands instead of raising so much hay and trying to graze as many head on the range as they can raise hay to feed in winter. Reduction of grazing should first be put into effect in game refuges. Finally when game has sufficiently increased, refuges may be eliminated, if real management plans have become effective. It is hardly to be expected game control can become really effective in a State until heads of game departments and the chief wardens are graduates of game schools. These game schools should train future county agents and leading farmers, landowners and other citizens as to the true value of all wild life, its value not only for food and fur, but also as destroyers of insects, and weeds, as well as the aesthetic value, should be realized by everyone. But management and education will amount to little until there is game to manage. Game has come back in most cases by the refuge method, so we must have the refuges and sanctuaries, at least for the present.



## REVIEWS

*Game Refuges: Chapter VIII of Game Management*, by Aldo Leopold.

We have previously discussed Leopold's definition of management as a manipulation of the factors of the environment. The refuge is a device for manipulation. Its chief use is in its restriction of hunting, but Leopold says that it "affects many or sometimes all the factors in a given case." That the effect is sometimes adverse is mentioned but not emphasized.

The definition given is that "A game refuge is an area closed to hunting in order that its excess population may *flow out* and restock surrounding areas." The outflow of game is both the purpose and the essential characteristic. If there is no opportunity for the game to spread beyond the boundary the area is not properly refuge. A fenced area would be a reservation not a refuge. Normally the purpose is to supply breeding stock to the surrounding area. For migratory game its purpose may be just a resting place, or a feeding ground during migration. Another purpose is to prevent the extermination of a species and to protect it during a period of recovery.

"Breeding stock does not flow out from an area unless there is *population pressure* within the area, or unless the range outside is better." (The italics are mine. P. K.) To produce the necessary population pressure there must be law enforcement and control of predators. The number of head that flow out depends on the population pressure, and the distance of the flow depends on

the mobility of the species. Any species will flow into favorable vacant territory *in the course of time*. The effective radius of a refuge is the distance to which it will spread breeding stock annually.

In size a refuge should be large enough to include the unit range of the animals to be protected. The distance apart should be twice the annual mobility of the species. The location should be such as to correct the primary defect of the surrounding range. Usually this is overhunting, but it may be a lack of suitable breeding ground. Refuges are practical only for the larger, more mobile animals. The number needed for the least mobile, such as quail, makes that type of protection impossible for general application. The bobwhite, for example, would require a refuge every four miles. The white-tail deer would require one about every twelve miles. Even for the most mobile of game it is difficult to get them properly spaced and located to cover the area. For the smaller upland game birds, several States are resorting to game farming or trapping to produce breeding stock for depleted or poorly stocked areas.

Game to stand up under a refuge system should first of all have a high radius, both annual and daily. "Without high daily mobility, it will not readily seek sanctuary from a considerable distance, and without high annual mobility the overflow of breeding stock will not take place."

The species should be capable of tolerating high population density, and should be able to endure a heavy kill. For this the polygamous species have an advantage. In addition, the land must be cheap in relation to its carrying capacity, or have some additional function to help carry the load. Land purchased for forest or for watershed protection may serve also as a refuge. Deer and turkey are examples of good refuge animals.

"The device of refuges is like any other device in game management—it presents no magic formula which can be counted upon to build up any species of game in any environment. Its successful use depends on knowing when not to try. A tragic waste of enthusiasm and funds has often followed blind reliances on refuges."

The "American Game Policy," published in 1930, indicates that refuges will play an important part in forest and wilderness management in the future. The reason for this is that the amount and distribution of hunting is hard to control in such areas. "Where hunting is under full control, there is little occasion for refuges."

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*Save America's Wild Life:* By J. N. Darling. Published in the Sunday Star, Magazine Section, Washington, February 25.

Mr. Darling, as you know, is now Chief of the Biological Survey, but was not when this article was written. He had, however, served on the President's Committee on Wild-Life Restoration since January 6, and had abundant opportunity to come in contact with his subject. His article, however, is not technical or statistical. Neither is it written for the technical reader. It presents general ideas for popular consumption and with popular appeal. Both its method of presentation and its choice of informational material should have

interest to game managers. To us it seems to overemphasize the migratory waterfowl and the destruction of their nesting grounds. I had thought it more a matter of feed than nesting. But anyhow that isn't the point. It is not a technical article, so makes no attempt to exact technical data. The real point is that he does not blame the scarcity of birds on the hunter but on the destruction or disturbance of their habitat—on drainage, and clearing, and other attempts at commercial use. His plan is to return to nature the millions of acres of low-value land on which economic development has proven uneconomical. The game were "crowded out of their native haunts by a civilization which could not live on the land after it had been 'reclaimed'."

But it is not only the clearing of submarginal land and the drainage of lakes and swamps that is criticized. "A sheep rancher's dead lamb out on the desert's rim, with the marks of a coyote's teeth on his throat, led to a campaign to destroy the predator. Destruction of the coyotes, whose preferred diet is jackrabbits, allowed the latter to multiply until they became a menace to crops. Now we must go out and poison a million jackrabbits—and we have more mutton than we know what to do with." Thus the predators are taken care of.

Not only has the unsuccessful reclamation of land through drainage destroyed waterfowl and impoverished settlers, it has destroyed a very profitable and much-needed production of fur. Muskrat and beaver not only produced a crop but stored water, raised the water table and held back floods. At a great expenditure of money and human energy, nature has been robbed. The thing to do is to give it back. There is nothing mysterious or difficult about conservation. Just give nature a chance. Give the mother bird a chance and no incubator will be needed. Looking at ourselves in the mirror of depression, what we see is "polluted streams, drained lakes, denuded hills and an unmarketable surplus of farm products." In fact, a surplus of everything except wild life. The new planned economy will provide for this, also.

The President's Committee on wild-life restoration tie their recommendations into the plan to withdraw submarginal or marginal land from production. It recommends the purchase of these lands and their use by wild life. This method they find practical, vitally necessary, national in scope, and of great economic and social importance. "The economic values are important and the cost less than one great bridge or housing project."

"The rapid depletion of the migratory waterfowl resources now universally admitted to be a fact is, in a large part, the direct result of the universal exploration of submarginal lands." The report provides also for upland game. Upland game birds, now merely a remnant, were once the finest in the world. Here again the purchase of submarginal farm land and the return of it to nature will take care of the situation. Song, insectivorous and ornamental birds are also taken care of.

"Big game, including bear, elk, prong-horned antelope and deer, are to have their quota of native range when and if the committee's report is carried out." But the profits from the upland game birds and the migratory water birds will help pay the bill. And the "sportsman is willing and anxious to pay."

The plan further provides for co-ordination with the subsistence homestead plans. The custodianship of game lands can be used to provide part-time employment for the subsistence farm home. It is estimated that about two such men for each 1,000 acres can be used.

"Extensive restoration of our wild life will recreate a national resource of incalculable value which will add immeasurably to the health, happiness and prosperity of the people of the United States."



## COMMENTS ON REFUGES AND PREDATORS

Before saying what I want to say about refuges, let me caution you again about taking what I say too seriously. What I say represents rather hastily formed opinions picked up mostly from reading, and has nothing to do with the policy or the plans of the Service. Should I say that refuges are undesirable, it would not mean that Management intends to revise its refuge policy. I discuss the science of management as I find it in books; you, as a manager, have the privilege of discussing its application to your management problems, with assurance that what you say will be given consideration.

The refuge is a common device for protection, in use where there is little or no management, and for counteracting the undesirable results of unlimited licenses. The refuge providing rest and feeding grounds for migratory birds is in another class. That class seems to meet a real need in a fairly satisfactory manner. The refuge as discussed and defined by Leopold has two serious defects which are only lately beginning to be recognized. One is that the instinctive habits of all animals prevent the "outflow" which Leopold says is a necessary part of the idea. The second is that a refuge, if protected from poachers and predators, inevitably leads in a short time to destructive overgrazing. It makes no difference whether the refuge is for song birds or big game, the natural increase in numbers will soon overtake the food supply. If a refuge is not overstocked, it is proof of either predators, hunting or disease. That many of them are overstocked and overgrazed is shown by Redington's paper. The condition in many of the Pennsylvania refuges was shown in another number. Destructive overgrazing by game is becoming a serious problem, more serious to the game itself than grazing by domestic stock. The examples cited by Redington are only some of the outstanding cases.

That game cannot be depended upon to flow out into the surrounding areas, even when "population pressure" becomes great, is shown by many reports and studies. The Pennsylvania bulletins reviewed in Lesson 24 tell of deer starving with good feed on adjoining range. The same thing is true in the Adirondacks. Mr. Redington tells us that the antelope and the deer on the Coconino all come back to the same winter range, even though now the palatable chamise and cliffrose are gone and the less palatable plants becoming scarce. Further studies are needed, but the evidence now indicates that each wild animal has its home range, and that most of them stay with the home range for life. A few wander off. The restlessness due to the mating instinct seems to influence wandering more than the seeking of fresh range. If it were not for this home instinct,

refuges would serve much better the purpose of management.

As a manager, however, you must consider this instinct and also the biological fact that all game animals increase rapidly in numbers. Also, as a protector of the physical resource, the soil and its cover, you must provide for the control of these numbers. This cannot be done with unlimited hunting and refuges, that is, by heavy hunting where game is scarce and no hunting where game is plentiful. Besides, there are many places where the number of hunters is not sufficient to remove the surplus. This is true on the Kaibab. One way to remedy the difficulty would be to increase the bag limit—allow each hunter two or more deer, or whatever the species is, depending on conditions. Another way is to depend in part on predators. This, as we have seen, is being done on the Kaibab. In some remote back-country areas it may even be necessary to protect and encourage the predators in order to hold other wild life down to the carrying capacity of the range. This may be necessary to control the Sonoran white-tail deer mentioned by Redington. It is probably the only method available in many cases. The thing is that our first obligation is to protect the basic resource. This seems to have been lost sight of in a number of places.

Where problems such as these confront a manager the refuge is of no help. It may even be a hindrance. The reports I have read indicate that it is wrong in principle and dangerous in its application. It is too rigid. The manager must have flexibility to meet the situations as they arise. Further, he must have control of hunting as well as of other factors. Good management cannot be legislated. Legislation may properly determine the policy and the objective but not the method. Further, the refuge is merely a makeshift attempt to restrict a frontier privilege without disturbing frontier traditions. If management is to replace the free-for-all hunting of the frontier, just as timber management has replaced uncontrolled cutting of timber, makeshift methods must go, and the manager must have control both of the number of hunters and the place of hunting. With such control, what does the refuge add? The Forest boundary is itself the "refuge" and all that is needed. Adding to that is apt to hinder rather than help. The refuge has served its purpose and must give way to better methods. Just how soon, I have not the slightest idea.

As to predators, the answer is not so easy. Game must be protected, and so must the basic resource, the range. Predators kill game and other things. Just what are we protecting when we destroy predators? Without accepting too literally Mr. Darling's statement about the coyote and the jackrabbit, we can accept the idea he was trying to get across. Dixon, in a rather extensive study of the food of coyotes and other predators, in California, found that the principal food of coyotes is rodents. They take some game, and when rodents are scarce they take more. We seem to need a few coyotes to hold down the rodents. If too many coyotes, they run out of rodents and turn to game, and so on. The game manager has to keep things in balance. In some places he must depend on predators to balance the game with the carrying capacity of its range. It is some job, but at that, the park managers have a bigger job than we. They have to try to make the whole works balance, and without the hunter; ask them what they think about the "balance of nature."

Too many people overestimate "nature" and what it can produce unaided. Range managers sometimes hold up the natural range as the ideal. Game enthusiasts almost invariably call the wilderness the ideal for game. Even Darling says that all we need to do is to turn the marginal land back to nature. (His plan really calls for 100,000 men to assist nature.) But any forester will tell you that a manager is no forester at all who cannot increase the production of a wild forest by 50 per cent. That figure ought to hold also for game management. Nature is always wasteful and runs to averages. By manipulation man produces maximums. Agriculture and Forestry are examples of how this is done. But in these fields the manager has an advantage. The game manager in general takes the poorer—the submarginal—land. It offers less opportunity for improvement. Nevertheless a manager can and must find ways to increase production. If he cannot improve nature he isn't a manager, he is only a custodian. However, that is getting off the subject. Forest managers are managers even though at times it may seem like what Darling calls "disordered progress toward an undefined goal."—P. K.



### SUGGESTIONS FOR DISCUSSION

The idea I had in mind for this lesson was game protection. So far most of the discussion has been on refuges, and most of that is pretty academic. It misses your refuge problems. You have refuges, and are likely to have for some time to come. You have a demand for more. Also you have problems in overgrazing. Under the Kaibab decision you have authority to protect the forest resource from damage by game, whether there is a refuge or not. With that authority it is not necessary to permit overgrazing, as has been done in Pennsylvania and other places, so possibly if that authority is used, the refuge may not be as big a handicap as I have pictured it.

Redington's discussion, however, indicates that it isn't being used, not in all cases, at least. Possibly we should discuss what the trouble is.

The question of illegal hunting under depression conditions is touched on in one of the discussions of Lesson 24. Possibly the depression won't last forever. Anyhow, that is purely a local situation, while the President, through the appointment of his wild-life committee, has made game decidedly a national issue. I think the most important question for consideration right now is, What difference is that going to make to us? I don't know. However, it has to be met. What difference can this make in our handling of game on the Forests? Will it change management plans in any way on your forest?

The next question involves domestic stock. There is developing, apparently, a demand that domestic stock grazing be restricted. The President's Committee recommends (4B) "the withdrawal of grazing privileges on extensive tracts of public domain and in the national parks and forests where . . ." Is the withdrawal of domestic stock the only way to increase game and game feed? To what extent can the two be correlated on the same range? Would the removal of the stock in itself solve any problems? Without authority over the game would it help, and with authority is it needed?

## QUESTIONS

1. What new problems, if any, are created by the new status given wild-life management, and how are such problems to be met? Discuss from the local point of view.
2. What in your opinion would be the effect on game, including its protection, its management, and its contribution to social welfare, to accede to the demands for restricted grazing by stock? Consider in relation to community development, subsistence farming, illegal hunting, and related social problems, as well as game numbers. What should be our position?
3. There seems to be developing a wave of sentiment in favor of the predator. What will be its effect? While predatory control is not directly our problem, it is a part of game and wild-life management. Should we change our policy as a result of popular demands? Or is it possible that such studies as that made by Dixon and others indicate a change in policy? What is your position from your contact with conditions in the field?



## DISCUSSION OF LESSON 24—DEER MANAGEMENT

In reading these discussions, I was reminded of a statement in a report reviewed in our first lesson. The statement was in effect that a "game manager" should be assigned to each Forest, not because the present administrative men on the Forests did not know how to manage, but because the pressure from other work prevented them from doing the things that they knew should be done. No one can read these discussions without being impressed with the truth of the first part of this statement, at least. They show that the essential principles of management are known and appreciated. The necessity for control of numbers through controlled hunting, the balancing of numbers against food supply, the futility of depending on refuges, and all these things that I have been emphasizing because they were new to me, seems to be old stuff to most of you. Forest officers do know, and can do a good job of managing.

However, there is an indication that there is another factor more important than time which prevents the type of management that you would like to see in effect. This is the uncertainty as to where you stand. The game is a product of the Forest, in fact one of the important forest resources, yet you are told to co-operate in its protection. You have the responsibility, while someone else has control. You cannot understand how such a thing is possible, so naturally you hold back, and depend on refuges. But if the public is going to demand more game and better management they will need to recognize that principle of management which says that authority must go with responsibility. One of the discussions assures us that the public is not so dumb. Maybe they are already beginning to learn.—P. K.

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G. E. MITCHELL

SISKIYOU

GRANTS PASS, OREGON

1. Public opinion is of two kinds—first, those who want to kill, and second, those who want to conserve. Where there is plenty of game, public opinion is

not strong for rigid law enforcement. It winks at law violation, thinking there are plenty, why make a fuss about a deer or a bird? We usually get more false complaints from farmers who want special privileges to kill game destroying crops.

But where game is scarce or being handled with care, consciousness is quite evident, and we often find the other extreme. What we need is a campaign such as the Livestock industry is putting on, "Truth in Meats." A public consciousness should be built up through assembling of facts as to conditions and values of game. There are conditions where game should be killed, and others where they should not. Without a sympathetic and well-informed public we can do little with game management.

2. Under full control of game and game areas, the average kill per permit can be determined. By using this as a basis, a certain number of permits or licenses can be sold with the intent of killing as many animals or birds. Such control, I believe, would be accurate enough. I do feel, though, that unless we know approximately how many individuals we have, and how many we should kill to keep our breeding stock within our range capacity, our management plan is not worth much.

3. Feed or range is a very important factor. In fact, it seems to me that it controls the whole situation. True, we may be able to plant both feed and cover where it can be done to improve natural conditions. But strict and proper management of natural range is the surest way of a game crop. Artificial help is all right in emergencies, but both from the standpoint of sport and recreation, natural conditions are most desired, and surely this is true from the standpoint of the game.

4. I think this is a sort of catch question. It has been done and can be done. Individuals can be caught in blind corrals, pitfalls and such, and earmarked or burned with an acid that will leave a white mark, such as a saddle mark on a horse. This does not sound very humane, and will probably not get by with the sentimentalist, but it gets by on a cow ranch.

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F. B. AGEE

BIGHORN

SHERIDAN, WYOMING

1. A great deal that we have accepted as fact in regard to game has been, and probably will continue to be, proven fallacy, and both we and the public may have to unlearn a great deal that we have learned. However, this is true in developing any new science. Game refuges, mentioned by the author, may cause us some future trouble in game management; nevertheless, they have served a very useful purpose in the past as a safety valve against extermination and as an aid in building up badly depleted supplies of game. Undoubtedly, at the present stage of development, it would be better to educate the public to the idea of planned scientific game management rather than spotlight too much any needed detail of it.

2. Much can be done about regulating hunting in harvesting the crop. Limited licenses specifying the sex of the animal to be killed will give sufficient control of the numbers to be removed and preserve the desired sex ratio,

particularly if hunters are assigned specified territory. It cannot, of course, be sufficiently controlled to bring about the removal of aged animals. Right at the present time there are several things standing in the way of a wider adoption of the limited license system. One is that many State Game Departments are operating on their fish and game license fees. The present system usually results in the sale of from three to five licenses for each game animal killed, and in some cases the curtailment of operating funds might be more detrimental to game production than the uncontrolled method of hunting. Also in localities where the present supply of game does not meet the demand for hunting the hunters themselves are opposed to it. They would rather buy their licenses and take their chance with the other fellow; that is, have the sport of hunting regardless of whether they bag the game.

In a great many cases, up to this time, we have not sufficient information on, or control of, other factors, such as loss from predatory animals, carrying capacity of range, etc., or for that matter on the total game population and rate of increase, to warrant attempting exact control of numbers killed. Such a system is, however, essential to the best game management, and is something that should receive more consideration from here on. Also, in the long run, it offers advantages to the sportsman, since it would remove the necessity for short seasons of a few days, or at most a few weeks, now common in many localities of the Rocky Mountain region. It is believed that it can and must eventually be brought about.

3. We should endeavor to forestall the overstocking of deer ranges, either winter or summer, since this usually results in unnecessary damage to private property, in unnecessary conflict of interest between the sportsmen and the stockmen, and the necessity for heavy reductions in order to give the range an opportunity to recover. While wholesale attempts at extension of their feed or cover would not justify the expense, yet there might be certain sites in certain localities where experimentation along that line might be warranted. The wide adaptation of willow cuttings in erosion control, as brought out in recent publications, might make it worth consideration on favorable sites; also experimentation might bring out other browse shrubs that have equally wide adaptation.

Probably a more productive result from management at the present time would be through directing effort towards obtaining a larger harvest from the same size herds by better control of predators, particularly the coyote. If the Kaibab's estimated loss from predatory animals is applicable to other game herds (and it is believed that it is) it indicates that the predators are harvesting about as many of the crop as the hunters. Rather close observation of the losses in Shell Canyon, on the Bighorn, during the winter of 1931-32 showed that, for each mature animal killed by predators there was a loss of slightly more than three fawns. While coyotes undoubtedly have some value in removing old and diseased animals from the herd, it seems a rather costly way of accomplishing this result.

Many problems face the game manager, but one of the most pressing at present, in the management of big-game animals, seems to be that of securing and maintaining a balance between numbers of animals and available forage supply. Since the Kaibab is an outstanding example of such a problem tending toward an oversupply of deer, a discussion of some of the methods of determining the relation of stocking to forage supply through plant utilization studies may be of interest. Here the numbers of deer have been reduced to a point where they are believed to be somewhere near the carrying capacity of the range. The approximate number of the deer population is necessary as a base from which to work, and this is best obtained by counts. Some idea of the relative size of the deer herd from year to year is gained by systematic annual counts, and these counts are of considerable value in management, but actual numbers cannot be determined accurately and utilization of the range is by far the safest and surest method by which to gauge the size of the deer herd. In order to use utilization as a basis the following information is being obtained:

- (a) Palatability of the different plants to deer.
- (b) What are the key plants upon which to base utilization?
- (c) To what degree can these key plants be safely utilized?
- (d) Which are the critical areas (or key areas) of the range upon which to base utilization?
- (e) What should be the basic year (average, poorest, or somewhere between, over a long period) upon which stocking should be based, and what is the relative production of forage during such a year?

With this information, safe standards of utilization can be arrived at and the size of the deer herd gauged accordingly. It will be necessary to determine the utilization of the key species at the end of each grazing season. This should be done preferably by actual measurements on a few carefully located plots supplemented by ocular estimates to insure getting an average figure over the critical areas. The critical areas, or key areas, on the Kaibab are the portions of the summer range and the midwinter range which are within the area of the deer concentration.

To say that the key species within these areas were over or under utilized after the end of a particular grazing season would not necessarily mean anything by itself. With proper stocking the range would be underutilized when forage production exceeded that of the basic year and overutilized when forage production falls under, but when utilization and growing conditions or relative volume of forage production are correlated it would be a sound indicator of whether the numbers of deer were too great or too small. Numbers of deer could not be adjusted immediately, but we would know in which direction to head, and could keep in line as nearly as the practical control of numbers would permit.

Is it true that we already know enough about game for successful, fairly intensive management? Many mistakes have been made in the past; game management is in its infancy, and many problems are still unsolved. It is admitted that the most difficult handicap at present is the lack of public edu-

cation. Would not the development of soundly based management plans do much to gain the confidence and co-operation of the public? Getting the co-operation of State game officials in the formation of management plans may go far in securing co-operation in the working of the plan.

Comments on questions of Lesson 24:

2. Elk hunting is effectively controlled in Utah by a committee which decides how many, what sex, and where the elk are to be hunted each year. Why cannot the same methods be applied elsewhere and with other classes of game? The answer seems to be one of public education and securing proper co-operation with the State and other agencies.

3. Supplemental feeding on winter range has several undesirable effects, as well as being costly—it makes game animals semi-domestic, causes congestion on feeding grounds which is inducive to diseases and would probably make them depend too greatly upon this feed.

4. Where deer can be trapped, different earmarks might be used effectively in marking for observation. A considerable portion of the ear would have to be cut to make the mark plain—this might be objectionable on areas where large numbers of tourists would see them. Paint shows up for only a short time. Tagging is very good for study of longevity and migration, if enough deer are tagged, but the deer cannot be recognized on the range, and must be killed before information can be obtained.

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FRED STELL

BIGHORN

SHERIDAN, WYOMING

1. Members of the Forest Service should take the lead in areas where National Forests are located in formulating plans for the proper management of deer herds, and in doing this must mold public opinion so as to secure the proper carrying out of these plans. We are the ones best adapted for this leadership, for several reasons. Among these may be mentioned our familiarity with forage plants, habits of game, a knowledge of the other uses to which the area is to be put, our supervision of a large part, if not all, of the range that the deer use, and many other reasons. To sum it all up, this work is "right down our alley."

Unfortunately, we do not know as much about the habits of deer as we should, and there is the possibility that in molding public opinion we will later be struck with a boomerang. However, we must take that chance, and in the meantime take every advantage to learn as much about the proper management principles as possible. In order to learn as much as possible about the habits of deer, we should make extensive observations and submit the results of our observations to some central point for correlation.

2. Hunting may be divided into two different forms: illegal and legal. The former can be controlled by (a) educating the public to realize that it is not sportsmanlike to kill game out of season, and (b) strict law enforcement. A large part of the people can be reached by the former method and the remainder by the latter.

We are able to harvest our timber crops in the best manner because we know what we are doing. We know what our capital stock of timber is, the kind of trees to remove, and the many things connected with the operation. In like manner we can control the harvest of deer if we know enough about the factors influencing the lives of the deer. We must know what the deer population of a given area is, the per cent of increase, the ratio of does to bucks, loss from predators, poachers, etc., number killed legally, areas where hunting should be allowed, what and where the demand will be, and many other factors. When we know more about such things the control of hunting will be easier.

3. The question of feed for deer immediately raises the question of what deer prefer to eat, and how much. Considerable study has been done on this, but more is needed. If we are to raise deer we must feed them. Every range has its maximum load, and when this is exceeded both the forage and the deer will suffer. In many places this is governed by the winter range. In such cases the maximum load can be increased by increasing the available winter feed. Where the demand for deer exceeds the supply, and the limiting factor is feed, we should be justified in planting for both feed and cover. But if we are feeding deer for coyotes, we would not be justified in planting more feed.

4. Deer can be marked in two ways: Ear markers can be used, but these have the disadvantage of being invisible unless the deer is caught or killed. They also are liable to be torn out in the brush. Deer can be branded the same as livestock, and it seems that this method would be the best, because a brand could be read without catching the deer. I have had no experience with the branding fluid such as is used on livestock, but it is possible that this would work to good advantage.

5. There are undoubtedly places where all is being done that can be done under the existing conditions. In such cases it would seem best to remove or alter "existing conditions." The "molding of public opinion" method is a slow, cumbersome way of handling the problem. It is reflected in the laws that are enacted for the protection of our game. These laws are not readily changeable to meet shifting conditions. General laws are desirable, but we should have more flexible interpretation of the general laws. Legislation by itself is one of the most futile things that we have. Effective administration of legislation is of utmost importance, and effective administration has to come from those who are deeply interested in game. My suggestion is that local councils of game management be formed, with representatives from the State, Forest Service, Biological Survey, Park Service, local game clubs, or any other organizations or bureaus concerned. This council to make such suggestions as necessary to the State Legislatures to secure the proper kind of general legislation and be given the power to put approved plans of management into effect.

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H. R. HUGHES

MEDICINE BOW

CENTENNIAL, WYOMING

The public will have to unlearn our present teachings and easily will if we can give them good reasons why they should, and back these reasons up with the proofs of experiment. There is a great deal to undo if managed sport means eliminating refuges, managers replacing game wardens, ownership of

game and control of the game changing to the proper hands, retaining ponds abandoned in favor of stream improvement; and so on. Yet I think if the ground to stand on is really firm, swinging public opinion is the easiest and last job to be done. So many mediums for reaching the public eye and ear exist that present accepted ideas can be swept away and new ones substituted almost over night. All we have to do is take a page from any advertisers' handbook. Advertising will take care of the public opinion, providing we have something that will stand the daylight of national attention. We might possibly scare up some game expert that hasn't been heard of yet.

The idea that seems to me to be impregnated better than any other in the heads of everyone thinking even a little bit about game is that conservation is all important, and that conservation means protection of refuge areas, confining the kills to one animal of a species, usually a male, and limiting the hunting season to certain periods, depending on the supposed supply of game. Of these the refuge idea is probably the firmest imbedded as being a wise conservation measure. At least we have so many of them, and demands for more all the time, that I think it must be. Why the refuge isn't necessary if all factors are controlled is quite understandable. All we have to do is convince the sportsman they can be controlled, and give him proof. If I gather correctly, we are fairly well started along that line in some localities.

Two years ago about 60 head of elk wintering on the Sheep Mountain Federal Game Refuge damaged haystacks on adjacent ranches. A meeting of the ranchers was held, and much pro and con concerning the presence of elk on this refuge was aired. The majority of the ranch opinion was against the elk. Three delegates were selected, and met a few days later at the Supervisor's headquarters town with representatives of local sportsman's clubs, Game and Fish Commissioners, Forest Service representatives and others interested in the problem. The ranchmen made speeches along the general lines of the inadaptability of the elk to this refuge and their worthlessness as a game animal and being a general nuisance. Their side of the question was poorly presented, and failed of conviction chiefly, I thought, because they were unaccustomed to addressing meetings and could not speak with the same clearness as they possibly would have if perched atop some corral fence. On the other hand the game enthusiasts were represented by two attorneys and a number of others accustomed to spellbinding audiences. The elk and accruing benefits of the refuge were clothed in some rather flowery language, and the few points presented by the ranchmen torn to bits. The general argument presented by the sportsmen can be summed up in the statement made at the meeting by the State Game and Fish Commissioner. He said: "This herd of elk forms a nucleus from which elk spread out over the entire Forest. If the elk are exterminated from this refuge it will mean the end of elk in this particular part of the State." In other words, the refuge is necessary to produce an increase to be hunted in other parts. Since the proposition of discarding refuges as impractical is being considered, I recall the results of this meeting as a bit of good evidence that the refuge idea has an exceedingly strong hold on the public mind, particularly in relation to the forming of nucleus herds for production of increases to be hunted as they stray from the protective boundaries.

This not only applies to elk, but just about everything classed as game and fish.

If we are going to manage game we will have to control the hunting. If we can get control of the game on the Forests and the marginal land used as game range I think we should. I presume it is a legislative matter, and to me it appears quite hopeless. However, if our reasons are sound they should produce results in time. If we can't get full control, the only thing we can do is tackle the present game administrators and present proofs of the adaptability and superiority of our plans. If it is determined that we will have to work in co-operation with these administrators we will have to take the initiative. First we ought to put our game managers and specialists on the job. When we are in a position to present workable plans the game agencies and the public can be approached. If both can be lined up the factors can be controlled.

The need for deer feed has high priority in a game management plan. We are going to raise crops of game animals and market them to sportsmen for a price. We can't do this unless we have enough feed to grow fat, healthy animals. Increasing the herds will increase the need for feed, and I think we will be justified in taking any artificial means necessary to increase the supply of both the feed and cover. I favor management that will make the herds pay their way. Money will be necessary to purchase privately owned marginal lands used as range. To some extent, I think we can eliminate or cut down the grazing of domestic stock.

For marking deer under observation I suggest aluminum ear tags, red in color, and large enough to be seen from a reasonable distance. It might be possible to stamp such a tag with numbers an observer would have a chance of distinguishing with binoculars.

Our deer management can be improved. We can move this activity from a neglected side issue to a paying business. We can get managers on the job and find out what we have, what we need, and make plans that will work and be put into effect. We can either get complete control of the game and the land it ranges or take the initiative in pushing through our plans in co-operation with the agencies we have to work with. We can use the radio, newspapers and magazines as mediums to inform the public and obtain their interest and approval.

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WELLS THURSBY

MANTI

EPHRAIM, UTAH

In game management, as in many other lines of work, new policies or methods of management are adopted from time to time. After adopting a new policy and putting it into working form it is occasionally left to take care of itself, whereupon it gets out of control. If on the Kaibab, for instance, when, in 1904, it was set aside as a National Game Preserve, the mature crop of game had been harvested as the situation called for, new drastic management plan changes would have been unnecessary. The Pennsylvania situation is the same, also a number of small refuges. In each case "Controlled Hunting" would have solved the problem. As with timber, game can and should be harvested. Foresters do not allow the harvesting of timber where there is need for an in-

creased stand, but where there is a mature crop. Our game management plans should call for harvesting when and where ready. Why, when the game crop is ready, not harvest it? If some section has a crop of game that should be harvested in March, why wait until next October? Why harvest game on an area where an increased crop is needed? Harvest these mature and special crops by volume, as with timber—not slaughter. Special seasons and special numbers.

Needs for game feed must be given immediate attention. In Utah, for example (game owned by the State), the owners of the deer market the forage crop on their deer ranch and turn their stock loose to get along as best they can. The State of Utah owns summer deer range, and also choice winter range. Instead of keeping this range for the deer herd, it is sold, leased, or left without control. If the State would set aside these areas for game a great part of the deer feed problem would be solved. Also the fight between private land-owners and game would be greatly simplified. It is only a matter of time until all of this State land now for sale must be bought back for deer range.

Game refuges can be made a great asset in game management. In many instances refuges have been established in the opposite location from where necessary. In localities where there is a fair game supply but distribution is not as desired, should not the refuge be established where deer population is wanted instead of where it is already thriving? Refuges correctly established should solve the distribution problem.

Would suggest for marking deer under observation the aluminum cattle tag with Electro-colored bangle, with color to suit the situation.

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RAY PECK

GRAND MESA

GRAND JUNCTION, COLORADO

1. Game and weather are talked about more than any other subjects that receive public attention, but very little is done about either. I have been attending Game Club meetings for the past twenty years, and find that public opinion is so divided on every question that comes up that it is impossible to get a group of clubs, or even one club, to agree upon a definite program. Lack of concrete, definite information is no doubt responsible for this situation. Forest men in one community are preaching different doctrines than in the neighboring towns. Therefore, in order to mold public opinion along the right lines it is essential that certain fundamentals of game management be threshed out by Forest officers and a definite policy adopted so that we can present a solid front and all be working toward the same ends. By the time these lessons are finished some such policy may be worked out.

2. In Western Colorado the game situation is about as follows: The State protective force is entirely inadequate for the task at hand. One warden is assigned to over three million acres of rough and more or less inaccessible territory. He is held down in traveling expenses to \$25.00 per month. He is informed by Sheriff's officers that it is of no use to arrest poor people that kill game, as the county cannot afford to board any more prisoners. Everybody is poor, nearly all kill game out of season, and no one is arrested. Deer come down close to the settlements during the winter months where cover is less

dense and they are more exposed. There is no question but what the limiting factor of proper game management is unlawful killing. The question of feed enters into the situation very little at the present time. On the winter range outside the Forest unregulated grazing has diminished the feed supply, but poachers have seen to it that no deer starve to death. The first problem in management, therefore, is to control the kill.

Under the existing setup the only remedy seems to be to arouse public opinion by convincing them that proper game management means money in their pockets or more enjoyment in their lives. Considerable work has been done along this line by Forest officers. At a meeting last year of the Consolidated Woolgrowers' Association the question of beaver poaching was discussed at some length, and finally each member went on record for strict enforcement of the law, and agreed to warn all trappers off the range and then to report them if they persisted. Notices were run in the local papers to this effect. This action brought the desired result and saved considerable range from drying up through destruction of beaver dams. Poaching can be reduced to a negligible factor through proper education of the public. Aroused public opinion will also demand that those in charge of game management assume their responsibilities.

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E. W. LOVERIDGE

WASHINGTON OFFICE

WASHINGTON, D. C.

Kep: In your comment on the Kaibab Game Management Plan you quote: "Timber reproduction is encroaching into the meadows and open flats in certain places. Serious consideration should be given to this . . ." You continue then with your own statement that "My hunch is that the local Forest officers would like to do something more than just 'consider.' The coniferous timber has only a recreational value. It furnishes little feed. The deer, too, have recreational value. What combination produces the greatest total value? But we, as foresters, are prejudiced against destroying timber. We protect it even when it destroys greater values. In that I wonder if we are somthing like the game enthusiasts, who insist on protecting deer on overstocked areas."

If I read between the lines properly here, you are continuing your campaign for a less thorough control of fires in forested areas, even though you include yourself in the statement that "we," etc. This makes me feel that you still fail to get the clearcut distinction between the point of view of the "thorough protectionists" and the other group, which I will not label for fear of unfairness to it. The thorough protectionist advocates the use of *controlled* burning under certain limited conditions. Other forms of *controlled* and planned "destruction" of forest cover is also recognized by him as most desirable under numerous conditions. On the other hand, for many sound reasons the thorough protectionist protests vigorously against unplanned, uncontrolled forest destruction, including burning.

The foregoing is not intended to renew our old controversy, although your dig was possibly intended to do so. What I have been leading up to is a proposal illustrative of the "thorough protectionists'" policy as to planned and controlled type of forest destruction.

Many of those who remember the appearance of the Colorado Plateau on which the Kaibab is located as it was before thorough protection from both grazing and fire damage was effected will admit that in general the open stands of yellow pine so common those days were much more beautiful, from a commonly held point of view, than are the present forest stands, so closed in with reproduction that long vistas and other desirable aesthetic factors have almost disappeared. That is, of course, as it should be on forests where timber growth is of primary value. On the Kaibab, however, other factors carry a very high priority. Maintenance of the open vistas so much appreciated by the recreation protectionist, therefore, proposes that these aims be obtained by the making of extremely heavy thinnings, almost to the point of elimination of the oncoming reproduction, either by labor which is available under the ECW program, or by some other economical means, such as the crushing down of the very young stands by tractors. The desired results would thereby be obtained from a game production and from an aesthetic point of view, and at the same time the forest floor would not be seriously enough disturbed to destroy other essential values.

It is appreciated, of course, that this is a minor matter compared with the points of policy mentioned by many of your other contributors. More complete control of game on the National Forests by the Federal Government is, in their judgment, apparently becoming a clearcut necessity if proper game management is to be obtained generally. These are certainly days of revolutionary proposals. Not long back a forest officer would have been tush tushed for even talking of such a suggestion. But now it reappears frequently, and in type in your booklets! !

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Earl: Your discussion of Lesson 24 is certainly a shock! It had never occurred to me that anybody could accuse me of ever having "campaigned for less than thorough control of fires."

I do have an awfully strong prejudice against all-inclusive taboos, including the one against fire. I have also a complex on control; I believe in it even for investment banks. Suppose my lesson from this is that I should be more careful to make myself understood. This is almost as bad as Headley accusing me of being antagonistic to work plans.—P. K.

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MARK R. RATLIFF

MEDICINE BOW

FOXPARK, WYOMING

Food supply, I believe, is first in importance for deer and elk management. I am taking these two, for I believe they come in conflict with our resources more than any other type of game.

It is quite apparent in most localities that we are confronted with the problem of either producing more feed on both summer and winter ranges or of decreasing the number of domestic stock using them. Rush, in his study, brings out the fact that the depletion of the Yellowstone herd of elk is chiefly due to the overgrazed condition of the winter range.

The problem of decreasing the number of stock seems the more feasible.

This would mean hardship for local ranches, and also consideration for these game animals in our Grazing Management plans. This is especially true of the elk, due to the type of feed they use.

I noticed that the Arapaho mentioned only the fact of the lack of winter range, but we figure the carrying capacities of our summer ranges in cattle and sheep months, and then in many cases fill the ranges to that capacity with domestic stock. Where do the deer and elk come in?

It appears that elk come more in conflict with cattle, especially in winter feeding, as haystack damages almost invariably occur. Deer, on the other hand, being browsers, conflict more with sheep. On my own district deer are very seldom seen on the heavily stocked summer sheep ranges, while on the cattle range, supposedly winter deer range, quite a few are seen during the summer months.

We cannot deliberately cut out domestic stock in order to allow deer and elk range. It would be best to buy up enough ranches to cut enough stock off the summer range to take care of a definite number of these animals. It is very likely, then, that we would have established, by the purchase of these ranches, enough winter range to support the herd.

Winter hay feeding, according to Rush, tends to decrease the stamina of the herd and increase their docility. The real sporting part of hunting is in shooting something wild, so we should not tend to domesticate them.

To get away from this hay feeding, which is both detrimental and costly, it should be possible that in maintaining the irrigation system already established on the ranches that are purchased and not cutting the hay we could establish enough feed so the herd would be able to rustle a living.

It is claimed that these meadows would go back unless they were cut each year. Perhaps they would go back to some extent, but still I believe that the irrigation would in itself increase the range enough so that a good rustling herd could easily maintain itself on it.

It is very apparent, of course, that we must definitely establish a plan where each area has a definite size of herd to support.

The size of this herd, then, must be based on the average season, and I doubt very much the advisability of feeding in the severest winters. Of course this will mean loss and decreased hunting for a year or so, but if we feed once we are in trouble.

Another point well worth considering in purchasing these ranches is that bird life would soon start using them as a breeding sanctuary, and even perhaps these could be developed into bird hatcheries to be used for distribution of birds to other ranges.

The problem of producing more feed on our ranges as they are would be so much slower that I believe it prohibitive. The cost, too, I believe, would be higher.

On the ranges of my acquaintance water seems to be the chief wanting factor. Irrigation is necessary to get good results. Then with irrigation we

could introduce the more luxuriant and faster-growing grasses. Recurrent growth would be a great deal faster and the grasses would become thicker.

The irrigation would immediately conflict with local ranching, though it might be worked out. It might prove that irrigation of the dry mesa-like areas, being situated as they are close to the source of the streams, would have little or no effect on the stream flow in general.

Another drawback to this is that we would have to increase the productivity of the low winter ranges also and broaden our scope of land control in order to keep the winter range up to productivity.

Often, too, the most desirable winter range is occupied by homesteaders and the like.

It should be possible, however, to work the two together. It is certain that the game herds will have to be increased as the demand increases, and perhaps this could be taken care of by increased productivity of all ranges.

In producing feed for deer and elk we should use a combination of purchasing ranches to decrease stock on the summer ranges and to increase the amount of winter range, and of increasing the productivity of the ranges to take care, as far as possible, of the increase that will be needed.

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C. S. ROBINSON

SANTA BARBARA      SANTA BARBARA, CALIFORNIA

1. Public opinion is influenced mainly by value received—what they get for money or time spent. At present it is in our favor, as the bulk of the deer hunting in R-5 is in National Forests. If we fail to maintain the supply of deer, or possibly attractiveness to the hunter, then the reverse will happen.

Regarding refuges. As we have had little to say as to the need or wisdom of choice of refuge, I do not believe we need to be concerned. I am of the opinion that many of the present refuges are unsuited for the purpose for which they were made.

Our best bet is to encourage the use of National Forest lands by all of the people, those who hunt with a camera or notebook as well as those who carry a rifle.

2. The simplest way to control hunting is by a plan of closed areas and bag limits. Permit two deer bags in areas where game population is thickest and damage to crop-lands, etc., apparent; decrease bag or close the area where opposite conditions are found.

3. What weight shall we give to the needs for deer feed? If we are to go into this game management right, then the answer is that food is fundamental to all life and, therefore, primary. The need of planting forage crops for deer is not important in this region. Increase in feed can be brought about in other ways, such as elimination of domestic stock, especially sheep or goats; salting will help.

4. Brand-Em-Oil, a preparation put out by the Franklin Serum Company

of Los Angeles, would be satisfactory. Brands or marks should be placed preferably on the buttocks, where the hair and skin are thin. Deer are more often seen leaving.

A deep undercut or slit ear is easily seen.

5. We are doing about the best we can under existing conditions. Time, money, and game ownership are our present primary needs.

In conclusion, may I add that nothing is so encouraging as to have these discussions and to feel that under the able leadership of Mr. Keplinger we are keeping the subject active? Game management has been something to sigh about, but it looks so much more hopeful now that we can smile most optimistically.